



GLORIA: A new instrument for atmospheric research deployed to Geophysica and HALO during the ESSENCE and TACTS/ESMVAL missions.

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The Gimbalbed Limb Radiance Imager of the Atmosphere (GLORIA) is a newly developed unique instrument that bridges the gap from scanning to imaging in the Infrared spectral domain. This is realized by combining a classical Fourier transform spectrometer (FTS) with a 2-D detector array tailored to the FTS needs. Imaging allows the spatial sampling to be improved by up to an order of magnitude when compared to a limb scanning instrument. GLORIA is designed to operate on various high altitude research platforms. The instrument is a joint development of the Helmholtz Large Research Facilities Karlsruhe Institute of Technology (KIT) and Research Centre Jülich (FZJ). GLORIA builds upon the heritage of KIT and FZJ in developing and operating IR limb sounders (CRISTA, MIPAS).

Atmospheric quantities to be measured are Temperature, H₂O, HDO, O₃, N₂O, CH₄, CFCs, HNO₃, ClONO₂ and some minor species indicating biomass burning and pollution, along with cloud distribution. A unique property of GLORIA measurements is the provision of well-resolved 2D-cross sections ('curtains') of atmospheric parameters along the flight path of the airplane or even 3D fields of trace species when dedicated flight patterns are carried out. These capabilities are a valuable added value to missions that are primarily equipped with in-situ instruments since it complements the vertical domain to the measurements taken by in-situ instruments on the flight level.

GLORIA has flown for the first time in December 2011 on board the Russian Geophysica M55 research aircraft from Kiruna/Sweden in the framework of the ESSENCE campaign. In August and September 2012 GLORIA was an integral part of the first large HALO missions dedicated to atmospheric research, TACTS and ESMVAL. The data which span latitudes from 80°N to 65°S form a unique treasure which allows to study a number of scientific questions, such as outflow of biomass burning products from Africa to the Atlantic Sea, filamentation at the edge of the Antarctic vortex, signals of pollution in air outflowing from Asia on the flight leg from the Maldives Islands to Cyprus, and validation of Chemistry Climate Models (CCMs).

The paper will provide an overview of the instrument, its capabilities and first results from the Geophysica and HALO deployments.